Amendments to the Claims

1. (CURRENTLY AMENDED) A method ~~(100)~~ for determining an approximately optimal resist thickness, comprising the steps of:

a) providing a first substrate ~~(110)~~ coated with a resist film having a first thickness using a first coat program ~~(105)~~;

b) measuring the first thickness ~~(115)~~;

c) providing a second substrate ~~(120)~~ coated with a resist film using the first coat program;

d) exposing the resist film on the second substrate ~~(125)~~ to radiation and measuring a reflectance spectrum near the actinic wavelength of the resist film;

e) determining an effective refractive ~~(140, 145)~~ index as a function of the periodicity of the reflectance spectrum;

f) determining a periodicity of a swing curve ~~(150)~~ of the resist film coated on the second substrate based on the effective refractive index; and

g) determining maxima and minima ~~(185)~~ as a function of the periodicity.

2. (CURRENTLY AMENDED) The method of claim 1 further comprising the steps of:

h) repeating steps a) to g) using a second coat program ~~(20)~~ for providing a resist film having a second thickness; and

i) determining average maxima and minima ~~(185)~~ as a function their respective periodicities.

3. (ORIGINAL) The method of claim 2, wherein the first substrate comprises a simple substrate.

4. (ORIGINAL) The method of claim 3, wherein the first substrate comprises silicon.

5. (ORIGINAL) The method of claim 2, wherein the first thickness is chosen to be near a lower limit of a predetermined range for the optimal resist thickness.

6. (ORIGINAL) The method of claim 5, wherein the second thickness is chosen to be near an upper limit of the predetermined range for the optimal resist thickness.

7. (ORIGINAL) The method of claim 6, wherein step e) the periodicity of the reflectance spectrum is fitted to $\cos(4\pi n^{Eff} t / \lambda)$ with n^{Eff} being the effective refractive index, t being the thickness of the resist film, and λ being the wavelength of the radiation.

8. (ORIGINAL) The method of claim 7 wherein the radiation comprises UV radiation.

9. (ORIGINAL) A method for determining an approximately optimal resist thickness, comprising the steps of:

a) providing a first substrate coated with a resist film having a first thickness using a first coat program, the first thickness being near a lower limit of a predetermined range for the optimal thickness;

b) measuring the first thickness;

c) providing a second substrate coated with a resist film using the first coat program;

d) exposing the resist film on the second substrate to UV radiation and measuring a UV reflectance spectrum near the actinic wavelength of the resist film;

e) determining an effective refractive index as a function of the periodicity of the reflectance spectrum;

f) determining periodicity of a swing curve of the resist film coated on the second substrate based on the effective refractive index; and,

g) determining maxima and minima as a function of the periodicity.

10. (ORIGINAL) The method of claim 9 further comprising the steps of:

g) repeating steps a) to f) using a second coat program for providing a resist film having a second thickness, the second thickness being near an upper limit of the predetermined range for the optimal thickness; and

h) determining average maxima and minima as a function their respective periodicities.

11. (ORIGINAL) The method of claim 10 wherein the first substrate comprises a simple substrate.

12. (ORIGINAL) The method of claim 11 wherein the first substrate comprises silicon.

13. (ORIGINAL) The method of claim 10 wherein step e) the periodicity of the UV reflectance spectrum is fitted to $\cos\left(4\pi n^{Eff} t / \lambda\right)$ with n^{Eff} being the effective refractive index, t being the thickness of the resist film, and λ being the wavelength of the radiation.

14. (ORIGINAL) A method for determining an approximately optimal resist thickness comprising:

providing two wafers comprising a simple first substrate;

providing two wafers comprising a second substrate;
coating the two wafers comprising the first substrate with resist films having a first and a second thickness near an upper and a lower limit of the predetermined range for the optimal resist thickness, respectively, using a first and a second coat program;
measuring the first and the second thickness;
coating the two wafers comprising the second substrate with resist films using the first and the second coat program;
exposing the resist film on the two wafers comprising the second substrate to UV radiation and measuring a first and a second UV reflectance spectrum near the actinic wavelength of the resist films;
fitting sinusoidal components of the first and the second UV reflectance spectrum;
determining a first and a second effective refractive index at the actinic wavelength based on the fitted sinusoidal components of the first and the second UV reflectance spectrum;
determining minima and maxima of a first and a second swing curve using the first and the second effective refractive index, respectively; and
determining corrected minima and maxima by averaging the minima and maxima of the first and the second swing curve.

15. (ORIGINAL) The method of claim 14 wherein the first substrate comprises silicon.

16. (ORIGINAL) The method of claim 14 wherein the periodicity of the UV reflectance spectrum is fitted to $\cos(4\pi n^{Eff} t / \lambda)$ with n^{Eff} being the effective refractive index, t being the thickness of the resist film, and λ being the wavelength of the radiation.

17. (ORIGINAL) The method of claim 16 wherein a best fit is found by iterating a Cauchy expansion of the effective refractive index.

18. (ORIGINAL) The method of claim 17 wherein the corrected minima and maxima are weighted inversely to their relative distances from the determined minima and maxima.

19. (ORIGINAL) The method of claim 18 wherein the predetermined range is between 0.8 μm and 0.9 μm.

20. (CURRENTLY AMENDED) A method ~~(600)~~ for determining an approximately optimal thickness of a resist film on a wafer substrate, comprising the steps of: depositing the resist film ~~(605, 610, 615, 620, 625)~~ at a predetermined thickness on a first wafer substrate;

exposing the resist film to radiation and measuring a reflectance ~~(630)~~ spectrum near the actinic wavelength of the resist film, the reflectance spectrum having a periodicity; and predicting the periodicity of a swing curve ~~(635)~~ from the periodicity of the reflectance spectrum.

21. (ORIGINAL) The method of claim 20, wherein, the periodicity of the swing curve is a function of incident angle of radiation, phase shift from reflective interfaces within the wafer substrate, and exposure wavelength, and thickness of the resist film.

22. (ORIGINAL) The method of claim 21, wherein the phase shift from reflective interfaces within the wafer substrate is regressed from a quadratic function of wave number wherein, $\delta=\delta_0+\delta_1/\lambda+\delta_2/\lambda^2$

23. (ORIGINAL) The method of claim 22, wherein the wavelength is dependent upon refractive index, wherein an effective refractive index is defined by a regression of a Cauchy expansion of the effective refractive index,